

Environmental Studies Program: Ongoing Studies

Study Area(s): Western, Central, and Eastern Gulf of Mexico OCS planning areas

Administered By: Headquarters

Title: Air Quality Modeling in the Gulf of Mexico Region (NSL #GM-14-01)

BOEM Information Need(s) to be Addressed: Air quality modeling needs to be conducted for the Gulf of Mexico Region (GOMR) to assess the Outer Continental Shelf (OCS) oil and gas development pre and post-lease impacts to the states, if any, as required by the Outer Continental Shelf Lands Act (1334 (a)(8)) (OCSLA). This information will be used by BOEM post-lease in the emissions exemption threshold analysis and pre-lease in the National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) cumulative analysis to support compliance with OCSLA.

Total Cost: (in thousands) \$2,756

Period of Performance: FY 2014-2018

Conducting Organization(s): Eastern Research Group, Inc., Ramboll Environ, and Alpine Geophysics

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Description:

Background: Under the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) is required to set the National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The USEPA has set NAAQS for six criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM_{2.5} and PM₁₀), and sulfur dioxide (SO₂). Because the CAA requires the USEPA to periodically review the science upon which the standards are based and the standards themselves, USEPA has issued a 24-hour PM_{2.5} standard in 2006, has lowered the NAAQS for the 8-hour ozone in 2008, and has issued two 1-hour standards, one for NO₂ and another for SO₂, in 2010.

Dispersion and photochemical modeling needs to be conducted to ensure that individual and cumulative offshore oil and gas exploration, development, and production activities do not significantly affect the air quality of any state as required under OCSLA. Air quality modeling requires various input datasets, including emissions estimates for all sources, meteorology, and pre-existing pollutant concentrations. This study would develop all necessary OCS GOMR air quality modeling inputs and conduct dispersion and photochemical modeling addressing OCS oil and gas related impacts to states.

Objectives:

- To evaluate current Weather Research and Forecasting Model (WRF) GOMR datasets and develop a new GOMR current 5 year meteorological WRF dataset, if necessary, sufficient as input into air quality models
- To perform a comparable 40 CFR Part 51 Appendix W Section 3.2.2 “Equivalency Demonstration” for modeling purposes
- To verify that the existing emissions exemption thresholds are protective of the annual and short term NAAQS using dispersion and photochemical air quality modeling
- If necessary, develop new emissions exemption thresholds using statistical methods if the existing emissions exemption thresholds are not protective of all NAAQS
- To assess air quality cumulative impacts to any state from offshore OCS activities, including assessing multi-sale 2017-2022 scenario impacts, using photochemical air quality modeling
- To conduct visibility analysis for the GOMR Class I areas: Breton Wilderness, Saint Marks Wilderness, Chassahowitzka Wilderness, and Bradwell Bay

Methods: Dispersion modeling is needed to determine if the emissions exemption thresholds used during the post-lease plans review phase (30 CFR 550.302 to 550.304) will need to be revised based on newer and lowered NAAQS. Industry must submit plans to BOEM before conducting exploratory drilling or initiating production, which include air quality spreadsheets that estimate air emissions as required under 30 CFR 550.218 and 30 CFR 550.249. These plans’ estimates of emissions are compared to an emissions exemption threshold to determine if the plan has impacts to the air quality of any state, and if the plan is therefore approved or denied. In the existing regulations and used by the GOMR, the exemption thresholds are based on distance to shoreline and was calculated using the Offshore Coastal Dispersion (OCD) model and older annual NAAQS standards.

OCD, AERMOD-COARE, and CALPUFF dispersion modeling will assess if the current emissions exemption thresholds are protective of all NAAQS. If they are not protective, new exemption thresholds need to be developed for the GOMR using modeling results and statistical analysis. Photochemical modeling undertaken in this study will be necessary to assess the exemption level thresholds for ozone. All modeling will need to follow 40 CFR Part 51 Appendix W (Guideline on Air Quality Models).

Photochemical modeling using the Community Multi-scale Air Quality model (CMAQ) and/or the Comprehensive Air quality Model with extensions (CAMx) is also needed to estimate potential cumulative impacts of offshore OCS air emissions to the air quality of any state. Past cumulative impacts studies completed in 1995 and 2005 no longer support current NAAQS standards. For photochemical modeling, multi-sale 2017-2022 scenario emissions estimates must be developed, all onshore and offshore emissions must be preprocessed, WRF meteorological datasets should be compiled, and resolution

grids over the GOMR with finer, nested grids over non-attainment areas and the Class I areas should be established. The modeling results will assist in defining the cumulative and next multi-sale 2017-2022 scenario impacts, if any, of all oil and gas development sources induced by OCS activity, including the formation of secondary fine particulate matter (PM_{2.5}) and ozone, plus visibility impacts analysis for Class I areas.

Current Status: A team of contractors has conducted the photochemical modeling to assess air quality cumulative impacts to any state from offshore OCS oil and gas related activities, which included development of WRF meteorological dataset and base and future year emissions inventory (multi-sale 2017-2022 scenario impacts). These photochemical modeling results were also used to conduct visibility analysis for the Gulf of Mexico Class I areas. Contractors will be conducting additional photochemical refined modeling with more accurate spatial allocation of future sources and updated sea salt algorithms. The contractors are also working with the USEPA to suggest the usage of AERMOD for dispersion modeling offshore (replacing the OCD model). The contractors are conducting AERMOD and CALPUFF dispersion modeling to assess the current emissions exemption thresholds and perhaps develop new thresholds to protect the NAAQS. Modeling results are due to BOEM in May of 2018.

Final Report Due: August 28, 2018

Publications Completed: None

Affiliated WWW Sites: None

Revised Date: February 5, 2018